SECTION 15300
FIRE PROTECTION SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Fire protection systems:
   1. Descriptions:
      a. Water based:
         1) Dry-pipe sprinkler system.
         2) Wet-pipe sprinkler system.

1.2 QUALITY ASSURANCE

A. Quality assurance, general:
   1. Provide complete fire protection systems as described in the Contract Documents and according to criteria of authority(ies) having jurisdiction (AHJ).
      a. Where discrepancies exist among the AHJ and Contract Documents, the most stringent requirements shall take precedence.

B. Authorities Having Jurisdiction:
   1. FLETC Safety Department.
   2. Water Supply Authority.

C. Referenced Criteria (applicable as referenced by AHJ):
   1. Latest edition of referenced criteria applies unless an earlier edition is specifically indicated by the AHJ.
   2. National Fire Protection Association (NFPA).
   3. Underwriter's Laboratories (UL).
   4. Factory Mutual Engineering Commission (FM).

D. Installer qualifications:
   1. Fire Protection Contractor shall be licensed, and shall provide evidence of the successful completion of at least five projects of equal or greater size and complexity.
   2. Use workmen skilled in this trade.
   3. Provide documentation that welders, and welding operators are certified in accordance with American Welding Society Standard AWS D10.9.
   4. Installation of the following items/systems shall be done by authorized representatives of respective manufacturers:
      a. Fire system valves.

1.3 SYSTEM DESCRIPTION

A. Design requirements:
   1. Design fire sprinkler systems.
      a. Obtain water supply fire flow test prior to designing systems.
      b. Design systems using adjusted water supply curve:
         1) Adjust the flow test water supply curve to correspond with the low hydraulic grade line as provided by the water supplier.
      c. Designs shall include a minimum safety allowance of 10 PSIG below the adjusted water supply curve.
      d. For systems with fire pumps, demonstrate (through calculations) that adjusted water supply is capable of providing a minimum of 20 PSIG at the suction side of the fire pump while the pump is operating at 150 percent of its rated capacity.

1.4 SUBMITTALS

A. Shop drawings:
   1. Submit detailed data and complete layout of fire protection systems approved by authorities having jurisdiction and prepared in accordance with the requirements for Working Plans described in applicable NFPA standards.
      a. Include calculations prepared in accordance with the requirements for Hydraulic Calculations described in applicable NFPA standards.

B. Product data:
   1. Backflow protection devices.
   2. Dry-pipe sprinkler system.
   3. Wet-pipe sprinkler system.

C. Contract closeout information:
   1. Letter stating spare parts have been delivered.
   2. Operating and maintenance data.
   3. Government instruction report.
   4. Test reports:
      a. Factory pump tests as indicated in this section's Part I "Quality Assurance" paragraph.
      b. Certification that tests as indicated in FIELD QUALITY CONTROL (Part 3) have been successfully completed and approved by authorities having jurisdiction.

1.5 JOB CONDITIONS

A. Arrange and pay for permits, fees and inspections required.

PART 2 - PRODUCTS

2.1 MATERIALS - GENERAL

A. Acceptable manufacturers:
   1. Alarm and signal devices:
      a. Base:
         1) Viking.
      b. Optional:
         1) Federal Signal.
         2) Fire-Lite Alarms/Notifier.
         3) Potter Electric Signal.
         4) Potter Roemer.
         5) Simplex Access Controls.
         6) United Electric Controls.
   2. Alarm-test device:
      a. Base:
         1) Viking.
      b. Optional:
         1) Grinnell.
         2) Victaulic of America.
   3. Backflow protection devices:
      a. Base:
         1) Cla-Val.
      b. Optional:
         1) Febco.
         2) Hersey Measurement.
         3) Watts Control Valves.
         4) Wilkins Regulator.
   4. Fire department connection:

a. Base:
   1) Elkhart Brass.
b. Optional:
   1) Croker West.
   2) Grinnell.
   3) JL Industries.
   4) Larsen's Manufacturing.
   5) Potter Roemer.
   6) Seco.
   7) Waterous.

5. Fire protection systems, water-based:
   a. Base:
      1) Viking.
   b. Optional:
      1) Automatic Sprinkler.
      2) Central Sprinkler.
      3) Firematic Sprinkler Devices.
      4) Globe Fire Sprinkler.
      5) Grinnell.
      6) Potter Roemer.
      7) Star Sprinkler.
6. Sprinklers:
   a. Base:
      1) Viking.
   b. Optional:
      1) Automatic Sprinkler.
      2) Central Sprinkler.
      3) Firematic Sprinkler Devices.
      4) Globe Fire Sprinkler.
      5) Grinnell.
      6) Reliable Automatic Sprinkler.
      7) Star Sprinkler.
7. Other manufacturers desiring approval comply with Document 00440.

B. Submit other pipe materials, joining methods, and equipment not specified, but accepted by applicable NFPA standards and approved by authority(ies) having jurisdiction, in accordance with Document 00440.

C. Use only new material of first class construction, designed and guaranteed to perform service required.

D. Provide fully operational systems.

2.2 PIPE, FITTINGS, AND SUPPORTS

A. Pipe and fittings - General:
   1. Meet or exceed applicable NFPA standards and Section 15060.
   2. Working pressure: Not less than 175 PSI.

B. Above ground pipe normally containing water:
   1. Examples: Wet-pipe and standpipe-and-hose fire protection systems.
   2. Black steel, Schedule-40:
      a. Threaded joints.
      b. Welded joints.
      c. Mechanical joints:
         1) Cut or rolled groove type.
         2) Mechanical locking (push-on) type.
   3. Seamless copper tubing.

a. High temperature soldered joints.

C. Above ground pipe normally containing air:
1. Examples: Dry-pipe fire protection systems; piping for alarm and sensing devices.
2. Galvanized steel, Schedule-40:
a. Threaded joints.
b. Welded joints.
c. Mechanical joints:
1) Cut or rolled groove type.
2) Mechanical locking (push-on) type.
3. Seamless copper tubing:
a. High temperature soldered joints.
4. Brass pipe, Schedule-40 (only for valve trim):
a. Threaded.

D. Pipe, below ground:
1. Same as outside utility fire protection piping.

E. Fittings:
1. Threaded:
a. Black cast iron, Class 150.
b. Black malleable iron.
c. Galvanized malleable iron.
2. Flanged:
a. Black cast iron, short body, Class 125.
b. Galvanized malleable iron.
c. Gaskets: Full face of 1/8 IN minimum red sheet rubber.
d. Flange bolts: ANSI-B18.2.
1) Hexagon head machine bolts with heavy semi-finished hexagon head nuts, cadmium plated.
3. Welded:
a. Black steel, standard weights.
4. Mechanical: ASTM-A47.
a. Malleable iron, 500 PSI working pressure.
b. Coupling gasket material: Butyl rubber.
c. UL listed.
d. Approved by FM, NFPA-13, and NFPA-14.
5. High temperature soldered:
a. Wrought copper.
b. Cast bronze.

F. Pipe supports:
1. All-purpose type, UL listed and FM approved.
2. Manufacture: Comply with Section 15140.
3. Supports, hanger rods, inserts and clamps acceptable to NFPA.

2.3 ALARM AND SIGNAL DEVICES

A. Alarm and signal devices, general:
1. UL listed and FM approved.
2. Coordinate electrical requirements with electrical contractor.

B. Alarm devices:
1. Alarm pressure switch:
a. Shall signal Fire Alarm System Control Panel upon sensing change of pressure in fire system valve.
1) Switch shall automatically reset when pressure returns to normal.
b. Service: Normal.
2. Local alarm devices:

a. General:
   1) Provide local alarm on systems of sufficient size as indicated in NFPA-13.
   2) Devices shall be weatherproof.
b. Alarm bell, electric:
   1) Shall provide audible alarm signal upon activation of fire protection system.
   2) 10 IN weatherproof bell.
   3) Provide backer plate to prevent birds and insects from entering inside of bell housing.
c. Visible light alarm:
   1) Semi-flush, 24 volt DC.
   2) Tamper-resistant white lexan lens, with "FIRE" imprinted in red.
   3) Light shall be mountable on either ceiling or wall.
d. Water motor gong:
   1) Shall provide local audible alarm indication upon sensing water flow through fire system valve.
   2) 175 PSI iron body mechanical alarm device with 8 IN diameter gong, 5 IN water motor.
   3) Drive shaft length compatible with wall thickness encountered.
   4) Red hood finish with nameplate.
   5) Provide wye strainer upstream of motor.
   6) Provide backer plate to prevent birds and insects from entering inside of bell housing.

C. Signal devices:
   1. Valve tamper switch:
      a. Shall signal Fire Alarm System Control Panel upon valve movement.
   2. Pressure supervising switch:
      a. Shall signal Fire Alarm System Control Panel upon drop in air pressure.
         1) Adjustable low-pressure setting.

2.4 BACKFLOW PROTECTION DEVICES

A. General:
   1. Provide on water supply at location indicated on drawings to prevent contamination of potable water system.
   2. Corrosion resistant materials.
   3. Totally rebuildable.
   4. Flanged ends.
   5. Rating: Water at 175 PSI working pressure and between 33 to 110 degF.
   6. Provide OS&Y inlet and outlet isolation valves.
   7. Provide four test cocks.
      a. Provide No. 1 test cock on inlet valve.
   8. Approved by authority(ies) having jurisdiction.
   9. UL listed and FM approved.

B. Double check detector:
   1. Two independently operating check valves.
   2. Bypass line with two independently operating check valves, water meter, three test cocks, and outlet shutoff valve. Bypass shall allow 8-10 GPM of flow before main-line assembly opens.

2.5 FIRE ALARM SYSTEM CONTROL PANEL

A. Fire alarm system control panel: Provided under Division Sixteen.

2.6 FIRE PROTECTION SYSTEMS, WATER-BASED

A. Dry-pipe fire protection sprinkler system:

1. Description: Automatic system shall employ closed sprinklers attached to a piping system filled with pressurized air and connected to an accelerated dry-pipe valve that is opened by actuation of a sprinkler which relieves air pressure in the system.
    a. Normal operation:
        1) Actuation of sprinkler relieves air pressure opening dry-pipe valve and allowing water to flow through actuated sprinkler.
        2) Waterflow through dry-pipe valve sends signal to Fire Alarm System Control Panel, and sounds local alarm.
    b. Failure operation:
        1) Failure of sprinkler relieves air pressure which opens dry-pipe valve allowing water to flow through failed sprinkler.
        2) Waterflow through dry-pipe valve sends signal to Fire Alarm System Control Panel, and sounds local alarm.
2. Air source:
    a. Provide dedicated compressed air system with air maintenance device.

B. Wet-pipe fire protection sprinkler system:
1. Description: Automatic system shall employ closed sprinklers attached to a piping system filled with pressurized water.
    a. Normal operation:
        1) Actuation of sprinkler allows water to flow through actuated sprinkler.
        2) Waterflow in zone sends signal to Fire Alarm System Control Panel.
    b. Failure of sprinkler allows water to flow through sprinkler.
        1) Waterflow in zone sends signal to Fire Alarm System Control Panel.

C. Air pressure maintenance device:
1. UL listed and FM approved.
2. Designed to maintain air pressure in fire protection systems.
3. Types:
    a. Restricted orifice.
    b. Pressure reducing valve (PRV).
        1) Integral back check.
4. Compatible with type of air source specified.
5. Provides continuous, regulated air supply to system.
    a. Restrict flow of supply air so that it does not interfere with actuation of system.
    b. Field adjustable outlet pressure: 5-75 PSIG.
6. Provide strainer and valved bypass.
7. Provide dedicated air pressure maintenance device for each separately pressurized portion of each system.
    a. Where two or more devices are served from the same air source, use PRV type devices.

D. Dedicated compressed air systems:
1. Air compressor:
    a. UL listed and FM approved.
    b. Dedicated to fire protection service.
    c. Mount pump and motor on common base plate with coupling and guard.
    d. Provide for mounting on wall, floor, or pipe.
    e. Capacity: Capable of restoring normal air pressure in system within 20 minutes.
    f. Field adjustable cut-in and cut-out pressure switch.
    g. Motor electrical data:
        1) Minimum 1/2 Hp.
        2) 120V, 1 ph, 60 Hz.
2. Air compressor accessories:
    a. Inlet silencer and filter.
    b. Discharge air and water separator, with relief valve, gauge glass and ball float valve.
    c. Discharge check valve, isolation valve, and pressure gauge.
    d. Pressure switch: HIGH/LOW operation.

e. Mounting hardware.
f. Piping and fittings.
g. Drip leg with drain valve to collect condensate, and keep it away from compressor.
h. Desiccant dryer.
1) Provide dryer when compressed air will be in piping exposed to freezing.

3. If a single compressor will be used to supply more than one sprinkler system, provide the following:
a. A receiver with pressure gauge.
b. On each sprinkler system supply: Check valve, pressure gauge, and isolation valve.

2.7 FIRE DEPARTMENT CONNECTIONS

A. Fire Department connection:
1. Components and assemblies UL listed and FM approved.
2. Minimum 175 PSI non-shock cold-water working pressure.
3. Inlet threads for connections to fit local fire department standards.

B. Fire department (siamese) connections.
1. Outside type.
2. Inlet:
a. Quantity:
1) Two.
b. Size:
1) 2-1/2 IN.
c. Fittings:
1) Brass snoots, brass pin-lug swivels, brass pin-lug plugs, chains, and gaskets.
3. Outlet:
a. Quantity:
1) One.
b. Size:
1) 4 IN.
4. Finish:
a. Satin brass.
5. Raised lettering:
a. "AUTOSPKR".
6. Connection style:
a. Flush, wall-mounted, and drop clappers.

2.8 FIRE SYSTEM VALVES

A. Fire system valves, General:
1. UL listed and FM approved.
2. Body: Ductile or cast iron.
3. Pressure rating: 175 PSI non-shock cold-water working pressure.
4. 2 IN and smaller: Threaded.
5. 2-1/2 IN and larger: Flanged or grooved.
6. Trim to meet NFPA requirements.
7. Trim to meet performance as indicated in descriptions of fire protection systems.

B. Dry pipe valves:
1. Cast bronze clapper, clamp ring, and valve seat.
2. Teflon coated valve seat.
3. Neoprene diaphragm and rubber seat.
4. Stainless steel seat-rubber retaining ring.
5. Locks open upon actuation.
6. Trim for priming, connecting alarms, testing alarms, draining system, preventing water logging, reading air and water pressures, and connecting air supply.

2.9 MANUAL VALVES

A. Isolation valves:
   1. Gate valves:
      a. 2 IN and smaller: V-49.
      b. 2-1/2 IN and larger: V-50.
   2. Butterfly valves:
      a. 2 IN and smaller: V-55.
      b. 2-1/2 IN and larger: V-51.
   3. Butterfly valves with tamper switches:
      a. 2-1/2 IN and smaller: V-59.
      b. 3 IN and larger: V-61.

B. Check valves 2-1/2 IN and larger: V-53 or V-54.

C. Grade-type post indicator valve assembly:
   1. Valve: V-52.
   2. Post: UL listed and FM approved indicator post to fit V-52.

D. Automatic ball drip valve:
   1. 1/2 IN straight or angle cast-brass ball drip shall close against pressure.
      a. When pressure drops, valve shall open to drain pipe.

2.10 SPRINKLERS

A. Sprinklers - general:
   1. Provide UL listed sprinklers of style and type required for service indicated.
   2. Orifice: Sprinklers in systems sized from pipe schedules shall have 1/2 IN nominal orifices.
   3. Finish of exposed parts: As indicated.

B. Sprinkler types: Metallic fusible link or glass bulb.

C. Sprinkler styles:
   1. Upright:
      a. Finish: Standard bronze.
   2. Pendant:
      a. Finish: Standard bronze.
   3. Pendant with escutcheon:
      a. Finish: Chrome.
   4. Concealed pendant:
      a. Ceiling plate flush with finished ceiling.
      b. Housing: 1/2 IN adjustment.
      c. Finish: White.
   5. Horizontal sidewall:
      a. Finish: Chrome.
   6. Horizontal sidewall, extended coverage:
      a. Finish: Chrome.
   7. Dry pendant:
      a. For coverage of exterior area from interior wet-pipe system.
      b. For systems with piping that is subject to freezing.
      c. Finish: Chrome.

2.11 SYSTEM ACCESSORIES

A. Alarm-test device:
   1. Optional replacement for alarm test loop.
   2. Single device or unit that provides visual verification of waterflow in a fire sprinkler system and allows for draining of all or a portion of that system.
   3. Contains sight glass, inspector test valve, auxiliary drain valve and test orifice.
   4. UL listed and FM approved.

B. Pressure gauges: See Section 15120.

1. UL listed and FM approved.

C. Spare parts:
   1. Tools:
      a. Furnish one emergency rubber ball shutoff on long handle to be used for temporary closing of sprinkler after fire has been extinguished.
      b. Furnish testing apparatus capable of producing the heat or impulse necessary to operate supplemental fire detection systems in manner recommended by manufacturer of detection system.
   2. Sprinkler cabinet, Wall mounted:
      a. Provide spare sprinklers of each type and sprinkler wrench for each type in quantities required by NFPA-13.
      b. Provide two spare fire-detection elements of each type for supplemental fire detection systems.

D. Sprinkler guards:
   1. UL listed.
   2. Heavy duty welded wire.
   3. Red baked enamel finish.

PART 3 - EXECUTION

3.1 GENERAL

A. Coordinate with other trades to ensure adequate space for equipment and piping placement.

B. Review plans, specifications and shop drawings of other trades to coordinate work.

C. Do not begin installation until after Agency approvals have been submitted to the Government.

D. Test systems in accordance with System Standards, manufacturers' instructions, and applicable NFPA publications.

E. Install systems in accordance with System Description, manufacturers' instructions, and approved shop drawings.
   1. Modifications to system design or arrangement after approval of drawings may only be made after receiving written approval by the Government and authority(ies) having jurisdiction.
   2. Such modifications do not include minor relocations in piping or sprinkler placement.
   3. Make revisions in accordance with NFPA.

F. Firestop penetrations in accordance with Section 15140.

G. Field quality control: Give advance notice and arrange for field tests and inspections by authority(ies) having jurisdiction.

3.2 PIPING, SPRINKLERS, AND SUPPORTS

A. Piping - general:
   1. Install sprinkler piping within first 6 IN of space under floor construction.
      a. Where conditions of construction require piping installation at a lower elevation, route piping to avoid interference with work of other trades.
   2. Offset, crossover and otherwise route piping to install system in available space.
      a. Not every offset is indicated.
   3. Provide chrome plated escutcheon plates at pipe penetrations of ceilings, floors, and walls.
   4. Pitch branch lines, cross mains, feed mains and risers to drains.
   5. Paint fire sprinkler piping in accordance with Section 15190.
   6. Flush outside fire-main piping prior to connecting to inside system.

B. Sprinklers - general:

1. Install sprinklers to provide and maintain minimum 18 IN clear between bottom of deflector and top of storage, files, shelving, and cabinets.
2. Standard-application temperature rating:
   a. Sprinkler type:
      1) Glass bulb: 155 degF.
      2) Fusible link: 165 degF.
   b. Where non-standard applications exist, use higher rating.
      1) Use sprinklers rated at least 50 degF higher than anticipated ambient temperature.

C. Supports: Install in accordance with NFPA-13.

D. Testing - general:
1. Test sprinkler piping, including outside supplies, under hydrostatic pressure of 200 PSI for 2 hours.
   a. Prove system tight to satisfaction of the Government.
   b. Inside piping shall indicate no leakage.
   c. Leakage in underground piping shall be in accordance with NFPA-24.

E. Piping and sprinkler applications by room types:
1. Areas subject to freezing:
   a. Sprinkler styles: Upright or dry pendant.
      1) Temperature rating: As required for room type.
   b. Provide sprinkler guards on pendant sprinklers.
2. Electrical rooms/closets:
   a. Sprinkler styles: Upright, pendant, or horizontal sidewall (standard or extended coverage).
   b. Provide sprinkler guards.
3. Finished rooms (rooms with ceilings):
   a. Sprinkler styles:
      1) Concealed pendant.
      2) Horizontal sidewall, standard or extended coverage.
   b. Where ceiling is being replaced in existing areas, relocate existing sprinklers to coordinate with new ceiling layout.
   c. Where ceiling exists in area subject to freezing, comply with requirements for areas subject to freezing.
   d. Locate sprinklers to coordinate with ceiling layout.
      1) Locate sprinklers centered in ceiling tile and in center of metal strip in linear metal ceilings, if such location makes added sprinklers necessary, provide added sprinklers as required to meet code.
4. Mechanical equipment rooms:
   a. Sprinkler styles: Upright, pendant, or horizontal sidewall (standard or extended coverage).
      1) Glass bulb temperature rating: 200 degF.
      2) Fusible link temperature rating: 220 degF.
   b. Provide sprinkler guards.
5. Storage rooms:
   a. Glass bulb temperature rating: 286 degF.
   b. Fusible link temperature rating: 286 degF.
6. Telephone rooms:
   a. Sprinkler styles: Upright, pendant, or horizontal sidewall (standard or extended coverage).
   b. Provide sprinkler guards.
7. Unfinished rooms (rooms without ceilings):
   a. Sprinkler styles: Upright, pendant, or horizontal sidewall (standard or extended coverage).

3.3 ALARM AND SIGNAL DEVICES

A. Install valve tamper switch on each isolation valve indicated below:
   1. Valves at bases of standpipes.
   2. Valves at fire system valves.
   3. Valves at backflow protection devices.
   4. Sprinkler-zone valves.
   5. Post indicator valves.

3.4 FIRE PROTECTION SYSTEMS

A. Factory trained Engineer shall supervise installation of fire protection systems.

B. Factory trained Engineer shall provide following services:
   1. Supervise installation of fire protection systems.
   2. Instruct Government's personnel in systems operations.

C. Test completed alarm systems including control and signal circuits wired by Electrical Contractor.
   1. Coordinate with electrical.
   2. Complete testing prior to substantial completion.

3.5 FIRE DEPARTMENT CONNECTION

A. Install fire department connection at height required by authority having jurisdiction.

3.6 MANUAL VALVES

A. Provide isolation valves at following locations:
   1. Fire system valves.

B. Provide check valves at following location:
   1. Fire department connection.

C. Install indicator posts approximately 3 FT above grade.

D. Provide automatic ball drip at low point.
   1. Piping between outside fire department connection and check valve.

3.7 SYSTEM ACCESSORIES

A. Alarm test loops:
   1. Provide after each waterflow detector.
   2. Alarm test loop consists of two parallel branches.
      a. First branch: Inspector's test branch shall contain a shutoff valve and a restricting orifice imitating the flow through the smallest sprinkler on the system. Provide means for inspector to observe water flow (e.g., drain water within sight of valve or provide sight glass).
      b. Second branch: Drain branch shall contain shutoff valve.
      c. Alarm test loop sizing criteria:
         1) Riser or Main is 2 IN or smaller: 3/4 to 2 IN.
         2) Riser or main is 2-1/2 to 3-1/2 IN: 1-1/4 to 2 IN.
         3) Riser or main is 4 IN or larger: 2 IN.
   3. Extend loops to nearest floor drain or mop sink.
      a. Loops may be terminated outside when approved by authority having jurisdiction.
   4. Label valves and outlets.

B. Drains:
   1. Permit complete draining of systems without disconnection of piping.
   2. Drain consists of dirt leg, valve, and piping.
   3. Extend drain piping to nearest floor drain or mop sink.
   4. Required locations:
      a. At low points of systems.
      b. At alarm test loops.

c. At fire system valves.
d. At bases of risers.
1) 1-1/2 IN hose threads that match local fire department threads may be provided instead of extending piping.

5. Size drain valve and piping according to alarm test loop sizing criteria in this section.
6. At offsets, plugs may be substituted for drains when approved by authority having jurisdiction.

C. Pressure gauges:
1. Provide at following locations:
a. At service entrance to building.
b. At top of each sprinkler riser.
c. At alarm test loops.
d. At other indicated locations.
2. Provide shutoff valve and drain for each gauge.

D. Sprinkler cabinets:
a. Install in location as directed by Government.

3.8 ELECTRICAL WIRING

A. Provide following:
1. Wiring diagrams for devices.
2. Wiring not specified but required to provide an operating system.

B. Electrical Contractor will provide the following:
1. Alarm and signal device wiring:
a. Tamper switches: Supervised wiring to Fire Alarm System Control Panel.
b. Alarm pressure switches: Supervised wiring to Fire Alarm System Control Panel.
c. Pressure supervising switches: Supervised wiring to Fire Alarm System Control Panel.
d. Supervised wiring from waterflow detector to outside alarm bell.

END OF SECTION